

Lesson 6

Understanding Databases

Knowledge Assessment

Multiple Choice

Circle the letter or letters that correspond to the best answer or answers.

1. Your application needs to store the product image out to a disk file. You'd like to minimize the size of this disk file. Which of the following objects should you use to write the file?
 - a. FileStream
 - b. StreamWriter
 - c. BinaryWriter**
 - d. XmlWriter
2. Your C# program needs to return the total number of customers in a database. The program will be used several times a day. What is the fastest way to return this information from your program?
 - a. Write a SQL query and use the SqlCommand.ExecuteScalar method to execute the query.
 - b. Create a stored procedure to return the total number of customers, then use the SqlCommand.ExecuteScalar method to execute the stored procedure.**
 - c. Write a SQL query and use the SqlDataAdapter.Fill method to execute the query.
 - d. Create a stored procedure to return the total number of customers, then use the SqlDataAdapter.Fill method to execute the stored procedure.
3. You need to modify the records in a Products table by marking certain products as Discontinued. However, you need to do this only when the UnitsInStock and UnitsOnOrder are both zero. Which of the following SQL statements should you use?
 - a. INSERT
 - b. SELECT
 - c. UPDATE**
 - d. DELETE
4. You need to update the Region fields for customers in Japan. You write the following SQL UPDATE statement:

```
UPDATE Customers
```

```
SET Region = 'EastAsia'
```

You test the query on a test database and find that more records were affected than you expected. You need to correct the SQL statement. What should you do?

- a. Add a WHERE clause to the UPDATE statement.**
- b. Add an additional SET clause to the UPDATE statement.
- c. Add a GROUP BY clause to the UPDATE statement.

- d. Add a HAVING clause to the UPDATE statement.
5. You are developing an application that needs to retrieve a list of customers from a SQL Server database. The application should move through the list sequentially once, processing each customer's record. Which of the following classes should you use to hold the customer list in order to achieve maximum performance?
- a. DataSet
 - b. DataTable
 - c. DataView
 - d. SqlDataReader**
6. The application you are developing needs to read data from a flat file that include items such as a five-digit integer key, followed by a 20-character customer name, followed by two date and time fields. Which of the following classes should you use?
- a. FileStream
 - b. StreamReader
 - c. BinaryReader**
 - d. DataReader
7. You are developing an application that will need to copy data from a SQL Server view to a DataSet. You name the DataSet object dsData. Which of the following methods should you use to copy the data?
- a. Fill**
 - b. InsertCommand
 - c. SelectCommand
 - d. Update
8. You are developing an application that manages customers and their orders. Which of the following situations is not a good candidate for implementation with stored procedures in your application?
- a. Retrieving the list of all customers in the database.
 - b. Retrieving the list of all orders for particular customers.
 - c. Inserting a new order into the Orders table.
 - d. Ad hoc querying by the database administrator.**
9. Your application connects to a SQL Server database that contains a table called Employees with the following columns:
- EmployeeID (int, identity)
EmployeeType (char(1))
EmployeeDate (datetime)
- You need to write a query that deletes all rows from the table where the EmployeeType value is either C or T. You do not want to delete any other rows. Which statement should you use?

a.

```
DELETE FROM Employees  
WHERE EmployeeType LIKE '[CT]'
```

b.

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```
DELETE FROM Employees  
WHERE EmployeeType LIKE '[C-T]'
```

c.

```
DELETE FROM Employees  
WHERE EmployeeType LIKE 'C' OR 'T'
```

d.

```
DELETE * FROM Employees  
WHERE EmployeeType IN ('C', 'T')
```

10. Your application includes a SqlDataAdapter object named sqlDataAdapter that connects to the Employees table. Based on this SqlDataAdapter, your application also includes a DataSet object dsEmployees. What line of code should you use to load the data from the database into the DataSet object?

a.

```
dsEmployees = sqlDataAdapter.Fill("Employees");
```

b.

```
sqlDataAdapter.Fill("dsEmployees", "Employees");
```

c.

```
sqlDataAdapter.Fill(dsEmployees);
```

d.

```
sqlDataAdapter.Fill(dsEmployees, "Employees");
```

Fill in the Blank

Complete the following sentences by writing the correct word or words in the blanks provided.

1. In order for a table to be in the **first normal form (1NF)**, none of the columns should have multiple values in the same row of data.
2. The **second normal form (1NF)** requires that all non-key columns are functionally dependent on the entire primary key.
3. The **third normal form (1NF)** requires that there is no functional dependency among the non-key attributes.
4. The basic building blocks for an entity relationship diagram are **Entity**, **Attribute**, and **Relationship**.
5. The **WHERE** clause in a SELECT statement evaluates each row for a condition and decides whether to include it in the result set.
6. The object used with the *using* statement must implement the **IDisposable** interface.
7. T-SQL's **CREATE PROCEDURE** statement can be used to create a stored procedure.
8. In the process of **normalization**, you apply a set of rules to ensure that your database design helps with data integrity and ease of maintenance in the future.
9. You find classes for working with streams and backing stores in the **System.IO** namespace.

10. The **X****M****L** format is a hierarchical data-representation format.

Competency Assessment

Project 6-1: Creating an Entity-Relationship Diagram

A company has a number of employees, and each employee may be assigned to one or more projects. In addition, each project can have one or more employees working on it. Draw an entity-relationship diagram for this situation.

1. As the first step, you must identify the entities. The two entities of interest based on the given description are Employee and Project.
2. Next, you need to identify the relationships between entities. Based on the description, Employees have an “assigned to” relationship with projects. The “assigned to” relationship is many-to-many because many employees can work on a single project and one employee can work on many projects.
3. Finally, you can draw the entity-relationship diagram based on the above analysis.

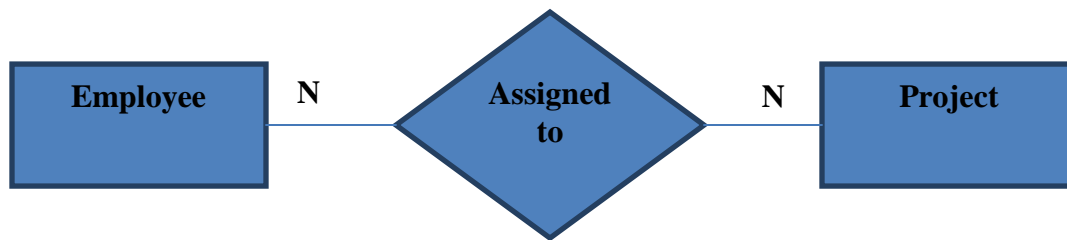


Figure 6-1
An entity-relationship diagram.

Project 6-2: Creating a Stored Procedure

You often need to generate a list of customers from a given country. Therefore, you decide to create a stored procedure that accepts the name of country as a parameter and returns all the customers from that country. How would you go about doing this?

1. Open Server Explorer and select the Northwind database. Right-click the Stored Procedure node and select the Add New Stored Procedure option.
2. In the stored procedure designer, replace the boilerplate text with the following code:

```
CREATE PROCEDURE GetCustomersFromCountry
(
    @country nvarchar(15)
)
AS
```

```
SELECT * FROM Customers
Where Country = @country
RETURN
```

3. **Save the stored procedure. The stored procedure is now added to the database.**
4. **To execute the stored procedure, right-click the procedure in the Solution Explorer and select Execute. In the Run Stored Procedure dialog box, type the name of the desired country and click OK. The results should be displayed in the Output window.**

Competency Assessment

Project 6-3: Normalizing Tables

You are converting an entity-relationship diagram into tables. You come up with the following table design:

Books

BookId	BookName	CategoryId	CategoryName
1	Cooking Light	1001	Cooking
2	Prophecy	1002	Mystery & Thriller
3	Shift	1003	Business
4	The Confession	1002	Mystery & Thriller

You need to apply normalization rules to ensure data integrity. How would you ensure that the Books table is in the third normal form?

1. **First, apply the first normal form. Each column in the Books table stores a single value and there are no repeating groups. Therefore, the Books table conforms to the first normal form.**
2. **Next, apply the second normal form. If a table satisfies 1NF and has only a single column in its primary key, then the table also conforms to 2NF. Thus, the Books table also conforms to the second normal form.**
3. **Next, apply the third normal form. The 3NF requires that there is no functional dependency between the non-key attributes. In the case of Books table, CategoryName is functionally dependent on CategoryId, and both CategoryName and CategoryId are non-key attributes. As a result, the Books table does not conform to 3NF. To fix this issue, the violating data needs to be stored in a different table. The new design should consist of the following two tables:**

Books

BookId	BookName	CategoryId
1	Cooking Light	1001
2	Prophecy	1002
3	Shift	1003
4	The Confession	1002

Categories

CategoryId	CategoryName
1001	Cooking
1002	Mystery & Thriller
1003	Business

Finally, you can apply all the normalization rules again on both the Books and Categories tables to ensure that they satisfy the 3NF. In this case, they do.

Project 6-4: Creating and Handling Events

You are working on an application that requires you to save customer information from the Customers table of the Northwind database into an XML file. This XML file will be used for various data integration tasks. You need to make sure that the root node of the XML is called Customers. The root node will then have a Customer node for each customer in the Customers table. How should you accomplish this task?

- 1. Create a new Visual C# Console application named DataSetXml.**
- 2. Modify the code in the Program class to the following. Be sure to change the connection string to match the local path of the database file on your computer:**

```
static void Main(string[] args)
{
    SaveDataSetAsXml();
}

static private void SaveDataSetAsXml()
{
    try
    {
```

```

        // Change the connection string
        // to match with your system.
        string connectionString =
            @"Data Source=.\SQLEXPRESS;" +
            @"AttachDbFilename=" +
            @"c:\SqlSampleDB\NORTHWND.MDF;" +
            @"Integrated Security=True;" +
            @"Connect Timeout=30;User Instance=True";

        SqlConnection connection =
            new SqlConnection(connectionString);
        string commandText = "SELECT CustomerId, "
            + "CompanyName, ContactName, "
            + "Phone FROM Customers";

        DataSet ds = new DataSet("Customers");
        SqlDataAdapter sda = new SqlDataAdapter(
            commandText, connection);
        sda.Fill(ds, "Customer");
        ds.WriteXml("Customers.xml",
            XmlWriteMode.IgnoreSchema);
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}

```

3. Add the following using directives to your program:

```

using System.Data.SqlClient;
using System.Data;

```

4. Build and run the project. Open the output XML file. You should see XML in the following format:

```

<?xml version="1.0" standalone="yes"?>
<Customers>
  <Customer>
    <CustomerId>ALFKI</CustomerId>
    <CompanyName>Alfreds Futterkiste</CompanyName>
    <ContactName>Maria Anders</ContactName>
    <Phone>030-0074321</Phone>
  </Customer>
  <Customer>
    <CustomerId>ANATR</CustomerId>
    <CompanyName>Ana Trujillo Emparedados y
helados</CompanyName>
    <ContactName>Ana Trujillo</ContactName>
  </Customer>

```

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```
<Phone>(5) 555-4729</Phone>  
</Customer>  
<!-- more customers will go here -->  
<Customers>
```